

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A method for producing an arborescent polymer comprising the steps of:
 - a. Epoxidizing a first polymer with an epoxidizing agent such that epoxide groups are chemically bonded to the first polymer at one or more sites; and,
 - b. grafting a second polymer onto the epoxidized first polymer such that chemical bonds are formed between the first and second polymers so that the bond is formed at the epoxide groups,wherein the second polymer includes reactive groups capable of forming bonds with the epoxide groups.
2. The method of claim 1 wherein the first polymer and the second polymer are either a homopolymer or a copolymer, and is either linear, branched or dendritic.
3. The method of claim 1 wherein the epoxidizing agent is a peroxy compound.
4. The method of claim 1 wherein the second polymer includes a single reactive group.
5. The method of claim 1 wherein the reactive groups are located at a terminal position on the second polymer.
6. The method of claim 1 wherein a cycle defined by steps a) and b) is repeated at least once, and wherein the polymer formed at b) of the preceding cycle is the substrate for the epoxidation reaction at a) in the subsequent cycle.
7. The method of claim 1 wherein the reaction between the first polymer and the second polymer, a promoter is utilized.

8. The method of claim 7 wherein the promoter prevents the neutralization of the anionic charge on the second polymer.
9. The method of claim 7 wherein the promoter is selected from the group consisting of a metal ion, a Lewis base, and a Lewis acid.
10. The method of claim 9 wherein the metal ion is a lithium ion.
11. The method of claim 10 wherein the metal ion is provided from a lithium salt.
12. The method of claim 11 wherein the lithium salt is selected from the group consisting of lithium chloride, and lithium bromide.
13. The method of claim 1 wherein the first polymer is selected from the group consisting of polyisoprene, and polybutadiene.
14. The method according to claim 1 wherein the second polymer is selected from the group consisting of polyisoprene, polystyrene, and substituted polystyrenes.
15. A one-pot method of synthesizing arborescent polymers, the method comprising the following steps in a single reaction pot:
 1. Copolymerizing a first polymer;
 2. Reacting the first polymer with an activating compound to generate reactive sites on the first polymer in order to produce a polyfunctional macroinitiator;
 3. Adding monomers having functional groups reactive towards the reactive sites on the first polymer, so that a bond is formed between the functional group and the reactive site;

wherein when a mixture of monovinyl and divinyl monomers is used in step 3, a grafted polymer generated by the above reaction may be subjected to a further cycle of activation and addition of monomers in order to grow side chains from the initiating sites.